an analysis on weather information, such as weather information received from the weather information source **120**.

[0017] The weather information source **120** may be any device, system, component, or collection of components configured to store, generate, predict, or otherwise handle weather information. Weather information at the weather information source **120** may include any weather information, including, for example, irradiance, cloud cover, cloud formation, cloud class, sky cover (e.g., the percentage of the sky covered with clouds), hours of sun shine, season (e.g., winter, summer), daily maximum temperature, daily minimum temperature, dew point temperature, temperature, relative humidity, wind speed, wind direction, daily probability of precipitation, solar azimuth angle, solar zenith angle, normalized hour angle, etc.

[0018] Weather information at the weather information source **120** may be available from any source, such as an almanac, a weather forecasting service, a news station, a database of physical observations, a web service, etc. In some embodiments, the weather information may be characterized as a data triad of a time (which may include any of the day, hour, minute, or second), a location, and associated data. For example, a data triad may include Jul. 4, 2015 at 10 AM at San Francisco, Cali. and may have corresponding weather information such as daily high of eighty-five degrees, ten percent sky cover, summer, and ten percent chance of rain. The weather information source **120** may include historical data for a variety of locations, such as the location of the solar power generating device **112**. The weather information source **120** may also include forecasts, projections, or other forward looking information regarding weather. In some embodiments, weather information such as historical data or forecasts of weather information may be communicated from the weather information source **120** to the control device **111** via the network **140**. In some embodiments, the control device **111** may generate a forecast of weather information.

[0019] The energy market **130** may be any system or collection of systems where electrical power may be purchased or sold. For example, the control device **111** may provide some portion of the electrical power generated at the VPP **110** to the energy market **130**. Additionally or alternatively, the control device **111** may acquire or purchase additional energy from the energy market **130** for distribution to one or more subscribers that receive electrical power from the VPP **110**. In some embodiments, electrical power may be reserved or otherwise provisionally purchased via the energy market **130**.

[0020] The network **140** may include any device, system, component, or combination thereof configured to provide communication between one or more of the control device **111**, the weather information source **120**, and the energy market **130**. The communication may include not only informational communication, but may also include other types of communication, for example, communication of electrical power. By way of example, the network **140** may include one or more wide area networks (WANs), local area networks (LANs), electrical distribution networks, powerline networks, etc., that enable the control device **111**, the weather information source **120**, and/or the energy market **130** to be in communication. In some embodiments, the network **140** may include the Internet, including a global internetwork formed by logical and physical connections between multiple WANs and/or LANs. Alternately or additionally, the network **140** may include one or more cellular RF networks and/or one or more wired and/or wireless networks such as, but not limited to, 802.xx networks, Bluetooth® access points, wireless access points, IP-based networks, or the like. The network **140** may also include servers, substations, or other connection devices that enable one type of network to interface with another type of network. Additionally or alternatively, the network **140** may include an Intranet, or one or more computing devices in communication within an organization or an in otherwise secure manner.

[0021] In some embodiments, the solar power generating device **112**, the wind power generating device **113**, the fossil fuel power generating device **114**, and/or the hydro power generating device **115** may be in communication with the control device **111** via the network **140**. Additionally or alternatively, the solar power generating device **112**, the wind power generating device **113**, the fossil fuel power generating device **114**, and/or the hydro power generating device **115** may be electrically in communication with a system for storing, distributing, selling, conditioning, or otherwise handling or controlling the generated power. In these and other embodiments, the control device **111** may be part of and/or may direct or control such a system.

[0022] In operation, the control device **111** may perform any of the operations described in the present disclosure. For example, the control device **111** may obtain a test dataset of historical weather information regarding the location of the solar power generating device **112** from the weather information source **120** via the network **140**. The weather information of the test dataset may include historical irradiance data. The control device **111** may use the historical irradiance data and a clear sky model of irradiance to normalize the historical irradiance data. For example, for a data point in the test dataset corresponding to a given time of day, the historical irradiance data for the data point may be divided by the clear sky irradiance for that time of day. After being normalized, the test dataset may be independent of the time of day or independent of the solar zenith angle. The normalized value may be referred to as the clear sky index.

[0023] Based on the normalized irradiance data (e.g., the clear sky indexes of the test dataset), the test dataset may be clustered into weather classes. Some examples of weather classes may include clear, overcast, or partly cloudy. Each class may have a corresponding set of characteristics, which may include any of the weather information described as being at the weather information source **120**. For example, the weather class of clear may have high irradiance and high daily temperature and low daily precipitation chances. The set of characteristics may also include a degree of unpredictability of irradiance. For example, an overcast or partly cloudy weather class may have a higher degree of unpredictability of irradiance than a clear class. One example of clustering the test dataset into weather classes may be illustrated and described with reference to FIG. **2**. In some embodiments, the test dataset may also be clustered based on a solar zenith angle (e.g. low solar zenith angle for up to approximately two hours after sunrise and up to approximately two hours before sunset, and a high solar zenith angle for approximately two hours after sunrise until approximately two hours before sunset). While two hours is used as an example, it will be appreciated that this value may also change depending on a variety of factors, including elevation, surrounding mountains or other terrain, or other factors